



~~DRAFT~~

MEMORANDUM

Date: February 9, 2000

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator 

Re: *Land Stewardship in Pima County*

I. Report

The attached draft entitled *Land Stewardship in Pima County* is the seventeenth in the technical series of reports being prepared for the Sonoran Desert Conservation Plan. It is one of several documents that describes biological status and management protection considerations under the conservation plan. The report provides (1) an overview of levels of management protection afforded to land within Pima County; (2) vegetation communities viewed within the context of varying levels of management protection; (3) an analysis of the amount of different types of vegetation that have been damaged or destroyed by urban, agricultural and mining uses; and (4) recommendations for gathering and assessing data that will improve the accuracy of future reports on this topic.

II. Levels of Reserved Land

The *Land Stewardship* report addresses an area of misunderstanding that arises in the public discussions of land use by describing how much land is protected within reserves, the level of protection, and the amount of unprotected land within Pima County. A national initiative called the Gap Analysis Program provides the framework and some of the information that staff relied on to assess the management status of land for biodiversity at six levels:

- Status 1a: An area that has permanent protection from conversion of natural cover and a mandated management plan to maintain a natural state within which disturbance events are allowed or mimicked through management.
- Status 1b: Same as 1a, but may have uses that detract from the quality of the land, with up to 5% of the land being managed in an unnatural state.
- Status 2: Similar to 1b, but over 5% of the land is managed in an unnatural state.
- Status 3a: An area managed for biodiversity, but not subject to permanent protection.
- Status 3b: An area managed for other purposes but which confers some protection for federal status species, and has some extractive or intensive uses.
- Status 4: An area allowing conversion of natural land, or an area with unknown status.

III. Method

The attached report provides a detailed explanation of the methods used to create this report, including an identification of the strengths and weaknesses of the data. To determine land stewardship, county staff members took steps including:

- ▶ Digitizing maps of the reserves in Pima County and reviewing and verifying boundaries with land managers. As a result, a more accurate mapping of the existing reserve system is now available.
- ▶ Researching, gathering, reading, and analyzing the management plans of existing reserves in order to assign a GAP management status. Table 2 within the report shows the over twenty reserves in the county, identifies the managing entity and notes the activities permitted, delineated into 23 categories from mining to grazing to hunting to hiking.
- ▶ Performing analysis of reserved land areas within each watershed subarea planning unit of the Sonoran Desert Conservation Plan.
- ▶ Estimating the amount of eight different vegetation types that have been damaged or destroyed as a relative measure by urban, mining and agricultural uses (although the impact of water diversions and pumping have not been described in this report).

IV. Results of the Analysis

Tables within the report summarize the acreage of land within each reserve in Pima County and the level of management, or GAP status of each. In general:

- ▶ 73.5 percent of all land in Pima County is within Status 4, i.e., there is no protection against conversion of natural cover to unnatural cover.
- ▶ 15 percent of all land in Pima County is within Status 1a, the highest protection, with 443,524 acres of that total managed by the U.S. Fish and Wildlife Service, 388,810 managed by the National Parks Service, 41,806 managed by the Forest Service, 7,182 acres managed by the Bureau of Land Management, and 1,243 acres managed by Pima County.
- ▶ 2.7% of all land in Pima County is within Status 1b, managed by four stewards: U.S. Fish and Wildlife (77,003 acres); Forest Service (57,120 acres); National Park Service (19,238); and The Nature Conservancy (2,793).
- ▶ 0.7% of all land in Pima County is within Status 2, with five stewards: Pima County (18,112 acres); National Park Service (13,994 acres); Arizona State Parks Board (5,453 acres); Bureau of Land Management (3,245 acres); and Bureau of Reclamation (2,717 acres).

- ▶ 0.05% of all land in Pima County is within Status 3a, with Pima County managing 2,643 acres, and The Nature Conservancy managing 180 acres at this level.
- ▶ 8% of all land in Pima County is within Status 3b, with five stewards: Forest Service (238,328 acres); Bureau of Land Management (132,275 acres); University of Arizona (51,984 acres); Department of Defense (44,278 acres); and Pima County (5,261 acres).
- ▶ Results of calculating the amount of vegetation damaged or destroyed show that as of 1992, urbanization had caused losses of over one quarter of a million acres, or more than twice the acreage of agriculture and mining combined.
- ▶ In terms of total acreage, the creosote-bursage series and the palo verde-mixed cacti series have suffered equally high losses as a result of these three land uses.
- ▶ As a percentage of total "baseline" vegetation, the riparian and saltbush communities have suffered greater losses (relative to their total acreage in Pima County) than have creosote-bursage or palo verde-mixed cacti vegetation, with losses on the order of 47% within the deciduous swampforest biome, 33% loss within the riparian and oasis forest (cottonwood-willow), and 50% loss within the Sonoran Desertscrub (saltbush) biome.

Type of Vegetation Displaced by Land Uses in Pima County		
GAP Vegetation Biome (Series)	Acreage	% Loss of Baseline
Chihuahuan Desertscrub (Creosote-Tarbrush)	427	3%
Sonoran Desertscrub (Creosote-Bursage)	148,505	11%
Scrub Grassland (Mixed Grass-Scrub)	30,000	2%
Madrean Evergreen Forest (Encinal)	30	<< 1%
Mogollon Deciduous Swampforest (Mixed Broadleaf)	7,569	47%
Sonoran Desertscrub (Palo verde-Cacti)	144,640	5%
Sonoran Riparian and Oasis Forest (Cottonwood-Willow)	939	33%
Sonoran Desertscrub (Saltbush)	22,351	50%
Sonoran Desertscrub (Unclassified)	1018	N/A
Unclassified	97	N/A
Water	24	N/A

The report notes that the data does not reflect landscape level conversions of grasslands to what is now creosote bush habitat, which may include tens of thousands of acres in Eastern Pima County. Loss of sacaton and other grassland cover in riparian areas is also not a part of the analysis of the attached report, since this baseline was altered prior to the mapping which forms the basis of the current analysis.

V. Conclusion:

The *Land Stewardship* report discusses management plans and the potential to achieve greater protection within the existing preserves by improving plans or tailoring them to what might ultimately be prescribed through the Sonoran Desert Conservation planning process.

Reserve managers are invited to review this report for purposes of accuracy and future planning. The Pima County Parks and Recreation Department has undertaken a more extensive review of management plans in anticipation of defining the Mountain Parks Element of the Sonoran Desert Conservation Plan.

This week, an invitation was issued to all federal land managing entities to enter into a cooperative relationship with Pima County to conduct a similar review of plans to assess the regional potential to meet endangered species compliance obligations through the improvement of reserve management practices and plans.

The report also points out important documentation needs for the final conservation plan, including the need to more precisely quantify mineral withdrawals within reserves, as well as the existing and potential affect of surface water diversions and groundwater pumping to otherwise protected land.

Attachment

Land Stewardship in Pima County

A Discussion Paper for the Sonoran Desert Conservation Plan

Prepared by Neva Connolly, Julia Fonseca, and John Regan

Table of Contents

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.0	Introduction	1
1.1	Purpose.....	1
1.2	Background.....	1
2.0	Methods.....	4
2.1	Land Stewardship.....	4
2.2	GAP Vegetation Cover.....	7
2.3	Calculating Acres of Vegetation Damaged or Destroyed.....	7
3.0	Results.....	11
3.1	Results by Sub-areas.....	14
3.2	Results by GAP Vegetation Map Units.....	14
3.3	Conversion of Land Cover by Urbanization, Mining, and Agriculture	18
4.0	Limitations to the Vegetation Displacement Analysis	20
5.0	Limitations to the Management Analysis	21
5.1	Protections of Natural Cover.....	21
5.2	Protection of Natural Disturbance Processes.....	22
5.3	Changes in Land Protection Status.....	22
5.4	Species-specific Analysis.....	23
6.0	Recommendations.....	24
7.0	References.....	25

FIGURES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	Existing Reserves.....	5

2	Pima County GAP/EROS Vegetation.....	8
3	Pima County Baseline Vegetation.....	9

LIST OF TABLES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	GAP Status Categorization	3
2	Management of Public Reserves Within Pima County, Arizona.....	6
3	Assignment of Arizona Game and Fish Department Map Units to GAP Vegetation Map Units.....	10
4	Land Stewardship and GAP Status of Protected Land in Pima County	12
5	Land Stewardship and GAP Status of Land in Pima County.....	13
6	Sonoran Desert Conservation Plan Sub-areas in GAP Management Status.....	14
7	GAP Vegetation Acreage Within Pima County Reserves.....	16
8	Percent of Pima County GAP Vegetation in Management Status Categories.....	17
9	Natural Land Cover Converted in Pima County.....	18
10	Type of Vegetation Converted by Land Uses in Pima County.....	18

APPENDIX

<u>LETTER</u>	<u>TITLE</u>	<u>PAGE</u>
A	Reserve Management Plan Summaries	26

1.0 Introduction

1.1 Purpose

The purpose of this report is to represent the different types of land stewardship in Pima County in a digital Geographic Information System (GIS) cover and to update our evaluation of vegetative communities relative to these classes. Our previous evaluation suggested that 24 percent of Pima County is in a reserve of some kind; the current evaluation now suggests 26.5 percent.

1.2 Background

The Gap Analysis Program (GAP) is a national endeavor to catalog the range of vertebrates or their habitat (based on vegetation) in every state and compare them to land ownership. The purpose of the GAP program is to provide state, regional, and national assessments of the conservation status of vertebrate species and land cover types of the United States, and to facilitate the use of this information for land management activities (Scott and Jennings 1997). A complete gap analysis consists of land cover, animal distributions, and stewardship coverages, which are intersected, overlaid, and incorporated into a final report.

The loss of biodiversity in the U.S. is a gradual effect, part of which can be attributed to habitat fragmentation. Habitat fragmentation is caused not by a single management decision, but by the collective impact of many different land stewards' decisions (Crist and Csuti 1997). GAP seeks to allow land stewards a method to assess their relative amount of responsibility for the management of an element through informed decision making (Crist and Csuti 1997). The term 'stewardship' is used because land owners are not always charged with managing the land. A land owner holds the legal title to the land while a land manager is defined as the "primary entity charged with managing the land unit" (Crist and Csuti 1997).

In order to assess the management status for biodiversity maintenance, it is necessary to compare stewardship attributes with categories of management status (Crist and Csuti 1997). The GAP uses a scale of 1 through 4 to represent the degree of management commitment to biodiversity maintenance. A status of 1 denotes the highest, most permanent level of commitment, while a status of 4 represents the lowest level of commitment, or an unknown status (Crist and Csuti 1997). Prescribed management, not land ownership, is the primary determinant in assigning status (Crist and Csuti 1997). Another key attribute is the permanence of protection of biodiversity maintenance through legal and institutional arrangements.

GAP Classification Scheme

GAP uses the following criteria and assumptions to determine management status for land units (Crist and Csuti 1997).

- *Permanence of protection from conversion of natural land cover to unnatural.* The assumption is that retention of natural land cover is fundamental in maintaining biodiversity.
- *Relative amount of the land unit managed for natural land cover.* Five percent was set as the maximum amount of land that can be managed in an unnatural state and still be considered "status 1."
- *Inclusiveness of management.* The assumption is that land managed to maintain all of its elements rather than managed for one species will maintain biodiversity better. Land managed for a "keystone" species is considered inclusive of all elements.
- *Type of management and degree that it is mandated through legal and institutional arrangements.* The assumptions are that management practices which allows or mimics natural disturbance events such as fire will maintain more biodiversity than will land units that suppress disturbance.

Using the above criteria, the management status categories can be defined (see Table 1).

Table 1: GAP Status Catagorization	
GAP Status	Status Description
Status 1a	An area having permanent protection from conversion of natural cover and a mandated management plan to maintain a natural state within which disturbance events are allowed or mimicked through management.
Status 1b	An area having permanent protection from conversion of natural land cover and a mandated management plan to maintain a natural state within which disturbance events are allowed or mimicked through management, but may contain uses that detract from quality of land such as visitor centers, high levels of traffic through land, heavily used trails and campgrounds. A maximum of 5% of the land is allowed to be managed in an unnatural state.
Status 2	An area having permanent protection from conversion of natural land cover and mandated management plan in operation, but receives uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. Over 5% of the land is managed in an unnatural state.
Status 3a	An area managed to maintain biodiversity, but not subject to permanent protection.
Status 3b	An area having permanent protection from conversion of natural land cover for the majority of the area, and subject to extractive uses of either broad, low-intensity type (logging), or localized intensive type (mining, bombing, residential). It also confers protection to federally endangered and threatened species throughout the area
Status 4	An area allowing conversion of natural land to unnatural throughout, or an unknown status.

Source: Crist et al 1998

2.0 Methods

2.1 Land Stewardship

To begin the land stewardship classification, digital maps of the reserves of Pima County were reviewed by staff and appropriate land managers. The reserve boundaries were verified by land managers, resulting in several changes. Internal management units within the reserves were also added if they indicated different levels of protection of land cover (Figure 1). Reserves were attributed with legal ownership and management authority.

Because of the way the GIS overlays different series of digital maps, differences between published reserve management plan acreages and corresponding GIS reserve acreages were found. The differences ranged from ten acres to over 1,000 acres for larger areas such as Coronado National Forest. For consistency in reporting, reserve acreages from the GIS were used.

Staff review of management plans resulted in assignment of GAP management status. A management matrix was created (Table 2), showing reserves, land stewards, and activities permitted. Summaries for the management plans were also developed (see Appendix A).

Previously designated SDCP sub-areas were also analyzed by land ownership and acreage. For this analysis, private and unreserved federal and state land were grouped into a category of "unreserved land." To determine the amount of unreserved land in each sub-area, the acreage of reserves were added together. This number was then subtracted from the total acreage of the sub-area. The resulting number was used as the acreage of unreserved land in each sub-area. During this analysis, "slivers" were also found. These are GIS errors, resulting from overlaying different digital coverages. All slivers were under one percent of reserve area acreage, and are inconsequential for this report.

U.S. Bureau of Land Management (BLM) Resource Conservation Areas are selected by the BLM for intensive public land management. These public lands are not offered for disposal or land trade. The RCAs contain public, state, and private land. The BLM is working towards acquiring and consolidating public ownership of private and state land through land exchanges (USDI 1988).

The Nature Conservancy (TNC) has deeded and easement land. TNC owns and manages deeded land. Easement land is owned by private property owners, but managed by TNC to maintain natural land cover, but also allows the land owner some amount of development. TNC easement land is private property and not considered a reserve.

Table 2: Management of Public Reserves within Pima County, Arizona

Reserve Name	Managing Entity	Activities Permitted																							
		Mining	Aggregate or fill removal	Landfills	Sewage Treatment	New Roadways	Groundwater Pumping	Surface Water Diversions	Stock Tank	New Utilities	Grazing	Farming	Hunting	Fishing	Trapping	Hiking	Camping	Wood Cutting	Horseback Riding	Off Road Driving	Mountain biking	Picknicking	Archery/Rifle Range	Public Education	
Wilderness Areas	Varies																								
Empire-Cienega Resource Conservation Area	U.S. Bureau of Land Management (BLM)																								
Silverbell RCA	BLM																								
Waterman ACEC	BLM																								
BOR Wildlife Corridor	USDI Bureau of Reclamation																								
Unreserved Coronado National Forest	U.S. Forest Service																								
Santa Catalina Research Natural Area	U.S. Forest Service																								
Butterfly Research Natural Area	U.S. Forest Service																								
Saguaro National Park (excluding wilderness area)	National Park Service																								
Organ Pipe Cactus National Monument (excluding wilderness area)	National Park Service																								
Cabeza Prieta National Wildlife Refuge (excluding wilderness area)	U.S. Fish and Wildlife Service																								
Buenos Aires National Wildlife Refuge	U.S. Fish and Wildlife Service																								
Barry M. Goldwater Range	Department of Defense																								
Santa Rita Experimental Range	University of Arizona																								
Catalina State Park	Arizona State Parks Board																								
Colossal Cave Mountain Park	Pima County																								
Tucson Mountain Park	Pima County																								
Tortolita Mountain Park	Pima County																								
Cienega Creek Natural Preserve	Pima County																								
Empirita Ranch	Pima County																								
Bingham Cienega Natural Preserve	The Nature Conservancy																								
Buehman Canyon and deeded land	The Nature Conservancy																								

2.2 Gap Vegetation Cover

The accuracy of the 1992 GAP vegetation maps for the purpose of the Sonoran Desert Conservation Plan was previously reviewed by staff (see *Evaluation of Previous Vegetation Mapping Efforts....* dated June 1999). Despite its inaccuracies, for convenience we use the existing GAP vegetation map to give a gross sense of the distribution of major land cover units within existing reserves. Staff determined that the accuracy of the boundary locations and the classification would need to be improved to be used for on a County level. RECON will revise and improve our understanding of the representation of vegetation and other components of habitat through the biology work plan developed by the STAT. In addition, staff recommended special attention be given to improving riparian vegetation delineations and classifications. That work is underway by Harris Environmental Group.

The original GAP vegetation coverage described the Green Valley area as "unclassified/mixed"; mixed is the more accurate term. The land cover is primarily low intensity residential and agricultural with some urban grasses and commercial/industrial/transportation use scattered among the grassland or shrubland. None of these land covers were depicted in the GAP coverage. In order to capture this information, it was necessary to "clip" the corresponding area from a land cover file provided by the Earth Resources Observation Systems (EROS). This file contained the diversity of land cover described above. The "clipped" area linework was "pasted" into the existing GAP coverage, edited and reattributed to reflect the original GPA classifications of urban and agricultural uses.

2.3 Calculating Acres of Vegetation Damaged or Destroyed

The GAP vegetation maps did not distinguish areas affected by mining verses urban land uses. The EROS land cover map was used to distinguish between mining and urban land uses represented on the 1992 GAP map (Figure 2). The area of vegetation damaged or destroyed was calculated by summing the area of polygons labeled as agriculture, urban and mining. This should not be interpreted as the acreage of complete vegetation loss, because the urban polygons would include areas containing some natural vegetation.

To quantify the amount of each GAP vegetation series that has been damaged or destroyed, a map depicting baseline vegetation was constructed (Figure 3). Polygons from Arizona Game and Fish Department's 1976 vegetation map were imported to replace agricultural, mining or urban polygons. Although GAP apparently used the boundaries of the AGFD map units to delineate some of the polygons in Pima County, there were a few inconsistencies created by this approach, for instance the area labelled as palo verde-mixed cacti series in the Aguirre Valley probably would have creosote-bursage. The appropriate GAP vegetation series for each AGFD vegetation class was identified (Brown and Lowe 1974). Table 3 cross-walks the two classification schemes. In addition, a polygon representing the former distribution of saltbush was added based on a 1974 USGS publication entitled *Map Showing Vegetation in the Tucson Area of Arizona*, by Raymond Turner.

Table 3: Assignment of Arizona Game and Fish Department Map Units to GAP Vegetation Map Units

AGFD Map Unit	GAP Vegetation Biome (series name)
Desert (Scrub) Grassland	Scrub Grassland (Mixed Grass--Scrub)
Saltbush	Sonoran Desertscrub (Saltbush)
Mesquite Bosque	Mogollon Deciduous Swampforest (Mixed Broadleaf)
Chihuahuan Desertscrub	Chihuahuan Desertscrub (Creosotebush-Tarbush)
Creosote-Bursage	Sonoran Desertscrub (Creosotebush-Bursage)
Mixed Palo Verde-Cacti/ Sonoran Desert Scrub	Sonoran Desertscrub (Paloverde-Mixed Cacti)
Riparian Deciduous Woodland	Sonoran Riparian and Oasis Forest (Cottonwood-Willow)
Encinal Oak	Madrean Evergreen Forest (Encinal)

3.0 Results

Table 4 summarizes the acreage and GAP status of the reserves in Pima County (Figure 1). Table 5 lists the land stewards, and acres of each managed in the different GAP categories.

Pima County has 26.5 percent (1,557,257 acres) of its land in reserves. More than half of the reserved acres have been evaluated and placed by staff into the GAP status 1 a. Most of the status 1a acreage is accountable to wilderness areas. The National Park Service, and the U.S. Fish and Wildlife Service manage a majority of the status 1a lands.

Twelve percent of the county's reserved lands were placed into status 1b and 2. These lands include heavily visited areas, including Catalina State Park, Organ Pipe Cactus National Monument, Saguaro National Park, and Tucson Mountain Park. A substantial portion of the status 1b and 2 lands are managed by the U.S. Forest Service, the U.S. Fish and Wildlife Service, and Pima County. The National Park Service and the state of Arizona also manage portions of status 1b and 2 lands.

Status 3a land has smallest representation, with 2, 823 acres (0.1 % of total land in protection). Tortolita Mountain Park and Bingham Cienega Natural Preserve are in status 3a.

Twenty-seven percent of the reserved land is within status 3b. This land either experiences extractive or detrimental uses such as the Coronado National Forest and Barry M. Goldwater Range, or lacks a management plan and/or permanent, legal protection such as Colossal Cave Mountain Park. The U.S. Forest Service manages a large deal of this land, with Coronado National Forest comprising 238,328 acres of the 472,194 status 3b acres.

Within Pima County, 73.5 percent of the land falls into status 4. This land has an unknown management status, or protection against conversion of natural land cover to unnatural cover is allowed throughout the area. This land is tribal land, private, and unreserved state, federal, county, and municipal land.

Table 4: Land Stewardship and GAP Status of Protected Land in Pima County

Managing Entity	Reserve Name	Acreage	GAP Status					
			Status 1a	Status 1b	Status 2	Status 3a	Status 3b	Status 4
U.S. Department of Defense	Barry M. Goldwater Range	44,278					x	
The Nature Conservancy	Bingham Cienega Natural Preserve	180				x		
U.S. Bureau of Reclamation	BOR Wildlife Corridor	2,717			x			
U.S. Fish and Wildlife Service	Buenos Aires National Wildlife Refuge	121,308	x					
	Cabeza Prieta National Wildlife Refuge	77,003		x				
	<i>Cabeza Prieta Wilderness Area</i>	322,216	x					
Arizona State Parks Board	Catalina State Park	5,453			x			
Pima County	Cienega Creek Natural Preserve (CC&R)	1,243	x					
	Cienega Creek Natural Preserve	2,643				x		
	Empirita Ranch	365					x	
	Colossal Cave Mountain Park	1,895					x	
	Tortolita Mountain Park	3,001					x	
	Tucson Mountain Park	18,112			x			
U.S. Forest Service	Coronado National Forest (unreserved)	238,328					x	
	<i>Butterfly Research Natural Area</i>	1,128		x				
	<i>Santa Catalina Research Natural</i>	881	x					
	Mt. Wrightson Wilderness Area	3,963	x					
	Pusch Ridge Wilderness Area	55,992		x				
	Rincon Mountain Wilderness Area	36,962	x					
U.S. Bureau of Land Manage	Coyote Mountain Wilderness Area	5,103	x					
	Baboquivari Wilderness Area	2,079	x					
	Empire-Cienega Resource Conservation	31,906					x	
	Waterman Mountains ACEC	3,245			x			
	Silverbell Resource Conservation Area	100,369					x	
The Nature Conservancy	The Nature Conservancy (deeded land)	2,793		x				
	The Nature Conservancy (easements)	68					x	
National Park Service	Organ Pipe Cactus National Monument	13,994			x			
	<i>Organ Pipe Cactus NM Wilderness</i>	317,278	x					
	Saguaro National Park East	8,803		x				
	<i>Saguaro National Park Wilderness Are</i>	58,540	x					
	Saguaro National Park West	10,433		x				
	<i>Saguaro National Park Wilderness Area</i>	12,992	x					
University of Arizona	Santa Rita Experimental Range	51,984					x	

Table 5: Land Stewardship and GAP Status of Land in Pima County

Managing Entity	Status 1a	Status 1b	Status 2	Status 3a	Status 3b	Status 4
U.S. Forest Service	41,806	57,120	0	0	238,328	0
U.S. Fish and Wildlife Service	443,524	77,003	0	0	0	0
U.S. Bureau of Land Management	7,182	0	3,245	0	132,275	0
U.S. Bureau of Reclamation	0	0	2,717	0	0	0
U.S. Department of Defense	0	0	0	0	44,278	0
Pima County	1,243	0	18,112	2,643	5,261	0
Arizona State Parks Board	0	0	5,453	0	0	0
National Park Service	388,810	19,238	13,994	0	0	0
The Nature Conservancy	0	2,793	0	180	68	0
University of Arizona	0	0	0	0	51,984	0
Unreserved land (private, state, county, etc.)	0	0	0	0	0	4,321,028
Total	882,565	156,154	43,521	2,823	472,194	4,321,028
% of Total Acres in Reserves (1,557,257)	57%	10%	2.80%	0.20%	30.00%	0.00%
% of Total Acres in Pima County (5,880,337) *	15.00%	2.70%	0.70%	0.05%	8%	73.50%

* Total % does not add to 100. Discrepancy due to 'slivers'- numerical errors resulting from compiling different digital coverages of reserves.

3.1 Results by Sub-areas

For planning purposes, Pima County has been divided into eight different SDCP sub-areas. Table 6 lists the sub-areas, acreage, and percent of land in each of the six GAP status categories. The percent in the sub-areas range from 97.8 to 28.5 percent of land in status 4 unprotected land.

Table 6: Sonoran Desert Conservation Plan Sub-areas in GAP Management Status

Sub-Area	Total Acreage	Status 1a%	Status 1b%	Status 2%	Status 3a%	Status 3b%	Status 4%	Status 1 + 2%
1	174,315	15	2.3	0	0.1	32.5	50.1	17.3
2	318,535	15	0.1	0	0.8	24	60.1	15.1
3	449,685	0.8	0	0	0	19.8	79.4	0.8
4	361,852	7.9	13.2	1.8	0	13.4	63.7	22.9
5	203,546	1.5	9.8	2.7	0	13	73	14
6A	713,807	17.8	0	1.2	0	4.3	76.7	19
6B	221,404	4.1	2.1	2.3	0	0	58.7	10
7	2,354,911	0.8	0.084	0	0	1.3	97.8	0.164
8	1,082,282	59.1	8.3	0	0	4.1	28.5	67.4
County Total	5,880,337	15.00%	2.70%	0.70%	0.05%	8%	73.50%	18.4%

Sub-area 7 is the largest sub-area, and has the least amount of known protected land. Most of the sub-area is owned by the Tohono O’Odham Nation. The degree to which natural land cover on the Nation is protected is unknown to Pima County.

The western portion of Pima County, sub-area 8, has the highest percentage of land in reserves, with 28.5 percent of land remaining in status 4. Sub-area 8 also has the highest percentage of land in status 1 and 2.

Although a majority of the reserves are located in eastern Pima County, the eastern sub-areas have at least 50 percent of their land in status 4. With the exception of sub-area 7, sub-area 3 has the lowest percentage of land in status 1 or 2, and 79.4 percent in status 4. While sub-areas 1,2 and 6A have at least 15 percent of their land in Status 1a, these areas have over three times that amount of land in status 4.

3.2 Results by GAP Vegetation Map Units

Table 7 lists the GAP vegetation series by acres in the Pima County reserves. Almost 89 percent of the County falls within three of the mapping series: Palo verde-Mixed Cacti, Creosotebush-Bursage, and Mixed Grass-Scrub. Of the 5 million acres in the three vegetation

series, 1.3 million acres are in a reserve, leaving over four million acres as unreserved land. The most common land cover types in the County may be the most vulnerable to development.

Vegetation series that occur in higher elevations such as the Madrean Evergreen Forest (Encinal), Madrean Evergreen Forest (Oak-Pine), Madrean Montane Conifer Forest (Douglas-Fir-Mixed Conifer), and the Madrean Montane Conifer Forest (Pine) are over 80 percent reserved by Coronado National Forest, and Baboquivari, Rincon, Pusch, Coyote, and Saguaro National Park East Wilderness Areas.

Other vegetation series that have over eighty percent of protection within reserves are Saltbush, Sacaton-Scrub, and Cottonwood-Willow series. The Saltbush occurs 100 percent in the Organ Pipe Cactus National Monument and the OPCNM Wilderness Area. The Empire-Cienega RCA is the only reserve to contain the Cottonwood-Willow series and the Sacaton-Scrub series.

The series least protected by reserves are the Creosote-Tarbush, Mixed Scrub, and the Mixed Broadleaf series. At least 75 percent of these three series fall outside of reserve boundaries.

GAP Vegetation Series by Status Categories

Table 8 displays the results of the GAP vegetation series and the acreage of each in the six different management status categories. Over half of the mapped manzanita, riparian mixed scrub, saltbush and water are located with protected (status 1 and 2) areas. Less than one-fifth of the Chihuahuan desertscrub, mixed evergreen sclerophyll, riparian mixed broadleaf, scrub grassland, palo verde-mixed cacti, and Mogollon cottonwood-willow vegetation is in a protected area.

Table 8: Percent of Pima County GAP Vegetation in Management Status Categories

Biome (series)	Status 1a%	Status 1b%	Status 2%	Status 3a%	Status 3b %	Status 4%	Total Mapped Distribution (Acres)	Status 1 + 2 %
Agriculture	N/A	N/A	N/A	N/A	N/A	98	69,620	N/A
Chihuahuan Desertscrub (Creosote-Tarbrush)	0.9	0	0	2.7	0.6	95.8	14,894	0.9
Chihuahuan Desertscrub (Mixed Scrub)	0	0	0	3	10	87	4,330	0
Madrean Evergreen Forest (Encinal)	21	19	0.03	0	40.7	20	156,038	40.03
Madrean Evergreen Forest (Oak-Pine)	21	0	0	0	44	35	27,667	21
Madrean Montane Conifer Forest (Douglas-Fir-Mixed Conifer)	57.6	0	0	0	42	0.4	1,737	56.7
Madrean Montane Conifer Forest (Pine)	27	14	0	0	54	5	16,656	28
Mogollon Chaparral Scrubland (Manzanita)	59	0	0	0	2	39	25,343	59
Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)	1	10	1	0	29	59	12,010	12
Mogollon Deciduous Swampforest (Cottonwood-)	0	0	0	0	80	20	1,172	0
Mogollon Deciduous Swampforest (Mixed Broadleaf)	0	0.4	0	0	11.6	88	8,491	0.4
Scrub Grassland (Mixed Grass-Scrub)	13	2	0.8	0.05	17.8	66.7	1,181,911	15.8
Scrub Grassland (Sacaton-Scrub)	0	0	0	0	90	10	4,875	0
Sonoran Deciduous Swamp and Riparian (Mixed Scrub)	51	0.3	0	0.4	0	48	13,601	51.3
Sonoran Desertscrub (Creosotebush-Bursage)	30	3	0.3	0.06	6	60	1,193,684	33.3
Sonoran Desertscrub (Paloverde-Mixed Cacti)	10	2	1	0.02	0.3	83.5	2,840,110	13
Sonoran Desertscrub (Saltbush)	85	15	0	0	0	0	11,084	100
Sonoran Interior Marshland (Cattail)	44	0	0	0	0	56	358	44
Sonoran Riparian and Oasis (Cottonwood-Willow)	12.6	2	0	13.5	10.8	60.7	1,781	14.6
Unclassified	21	0	17	0	5	57	2,794	38
Urban	N/A	N/A	N/A	N/A	N/A	99.7	288,063	N/A
Water	55	0	0	0.2	3.5	41	3,834	55
COUNTY TOTAL	15	2.7	0.7	0.05	8	73.5	5,880,337	18.4

3.3 Conversion of Land Cover by Urbanization, Mining, and Agriculture

In Pima County, urbanization (as of 1992) had damaged or destroyed more than twice the areage of agriculture and mining combined (Figure 3, Table 9).

Land Use	Converted Acreage
Urban	237,858
Agricultural	35,907
Mining	35,907
Total	355,604

In all, six percent of Pima County's natural land cover has been converted by these three land uses.

In terms of total acreage, the creosote-bursage series and the palo verde-mixed cacti series have suffered equally high amounts of loss to these three land uses. As a percentage of total "baseline" vegetation, the saltbush and riparian communities have suffered greater losses (relative to their total acreage in Pima County) than have creosote-bursage or palo verde-mixed cacti vegetation (Table 10).

GAP Vegetation Biome (Series)	Acreage Converted	% Loss of Baseline
Chihuahuan Desertscrub (Creosote-Tarbush)	427	3%
Sonoran Desertscrub (Creosote-Bursage)	148,505	11%
Scrub Grassland (Mixed Grass-Scrub)	30,000	2%
Madrean Evergreen Forest (Encinal)	30	<<1%
Mogollon Deciduous Swampforest (Mixed Broadleaf)	7,569	47%
Sonoran Desertscrub (Palo verde-Cacti)	144,640	5%
Sonoran Riparian and Oasis Forest (Cottonwood-Willow)	939	33%

Table 10: Type of Vegetation Converted by Land Uses in Pima County		
Sonoran Desertscrub (Saltbush)	22,351	50%
Sonoran Desertscrub (Unclassified)	1018	N/A
Unclassified	97	N/A
Water	24	N/A

4.0 Limitations to the Vegetation Displacement Analysis

There are sufficient inaccuracies and omissions in our knowledge of existing and baseline land cover units that conclusions about the representation of units across the landscape should be drawn in a relative fashion. Although relatively little grassland has been displaced by urbanization, mining or agriculture, the "baseline" vegetation map does not reflect the historic landscape-level conversion of grasslands to creosote bush-dominated desert scrub. We speculate that this conversion may have affected tens of thousands of acres in eastern Pima County. Loss of sacaton and other grassland cover in riparian areas is also not included in this analysis.

A previous analysis (*Pima county Habitat Inventory* by Dr. William Shaw and others) found that more than 50% of their metropolitan Tucson study area was natural open space. Therefore, the area mapped as "urban" in the GAP seems likely to contain extensive tracts of land which retain natural cover.

5.0 Limitations to the Management Analysis

5.1 Protection of Natural Vegetative Cover

A basic premise made in GAP land stewardship classification is that the higher status levels confer greater levels of protection of natural vegetative cover. Two exceptions to this assumption are of concern to the Sonoran Desert Conservation Plan: these exceptions include hard-rock mining and water diversion/extraction.

Many federal, private, and County lands currently within reserves are subject to conversion under the 1872 Mining Law. The law allows the mining of hard-rock minerals (such as copper, gold, and silver) and precludes surface-owner discretion on whether mining may proceed. Southern Arizona is a mineral-rich area. Copper in particular is a mineral of importance to the economy, and many copper deposits are located in Pima County. Mining can and usually does result in complete loss of natural cover.

While it would be desirable to know which lands are subject to existing and future mining, this information was not available to us for the purpose of land stewardship classification. However, records of federal withdrawals of mineral rights are available, and could be described on a GIS.

At present, we are aware of mineral withdrawals at the following locations:

- Baboquivari Wilderness
- Coyote Wilderness
- Goldwater Range
- Pusch Ridge Wilderness
- Rincon Wilderness
- Saguaro National Park
- Organ Pipe Cactus National Park
- Tucson Mountain Park
- Waterman ACEC
- Cabeza Prieta Wilderness
- Organ Pipe Cactus National Monument

These withdrawals preclude future mineral claims, but they generally do not prohibit development of valid claims. Many federal reserves were established with ongoing mining operations or other valid existing rights. We have made no attempts to identify the location of the mines or claims, or quantify the land area subject to these claims.

The GAP land stewardship classification also does not reflect the degree of protection offered to water-dependent land cover. In some reserves, water diversions reduce the reliability of surface flows. These factors, in turn, would or do affect the quality of riparian vegetation within those reserves. For instance, the perennial flows of Cienega Creek are wholly diverted out of the natural channel for irrigation purposes within the Cienega Creek Natural Preserve. Furthermore, the Empirita Ranch is subject to future groundwater pumping of up to 1,600

acre-feet per year, a figure which would likely result in further reductions of perennial flows within the Cienega Creek Natural Preserve.

5.2 Protection of Natural Disturbance Processes

Another premise of GAP land stewardship is that lands which have a high degree of protection of land cover also manage for natural disturbance processes. While this is true in the gross sense, it is not necessarily true for a specific reserve or all resources within that reserve. For instance, Arivaca Lake modifies recharge and flooding along the Arivaca Creek land holdings of Buenos Aires Natural Wildlife Refuge, precluding management for natural flooding processes. Until recently, channels and levees diverted flooding along a portion of Cienega Creek into another drainage. Bureau of Land Management has restored flooding as a process to that area.

Fire may be an important disturbance process shaping the distribution and structure of grasslands and forests. We have not identified where fire management includes mimicking natural fire frequency or allowing natural fires to occur. We are aware that many agencies are considering or undertaking prescribed burning, but do not have any GIS representation of locations where fire is allowed as a natural disturbance process. Reserves containing natural cover (such as grassland or forests) which may need recurrent fire include, but are not restricted to:

- Buenos Aires National Wildlife Refuge
- Coronado National Forest
- Santa Rita Experimental Range
- Empire-Cienega Resource Conservation Area
- Bingham Cienega Natural Preserve

5.3 Changes in Land Protection Status

Land stewardship changes over time. Each individual land manager may interpret the stewardship mission differently, and land ethics and regulations evolve even within a given agency.

Current stewardship categories as listed in this report do not reflect the legacy of past management actions. For instance, the effects of historic overgrazing, introductions of exotic species, and past agricultural clearings continue to affect the land within the Cienega Creek Natural Preserve and Bingham Cienega Natural Preserve, despite changes in management from status 4 to status 3 over the past decade.

Finally, activities which are precluded by management plans are not necessarily precluded in fact. For instance, even though off-road or off-trail use may be prohibited, discussion with land managers might reveal land cover damage is occurring. No interviews with land managers were conducted as part of this report, however we hope that land managers reviewing this report will identify where land cover stewardship may not be adequately represented.

About 27 percent of the reserves in Pima County are in the status 3a and 3b category. Management plans and permanent legal protection could be adopted for Colossal Cave and Tortolita Mountain Parks, and well as Bingham Cienega and Cienega Creek Natural Preserves. These changes would shift the reserves to at least status 2 or higher. Excluding ground water pumping at Empirita Ranch would also improve the reserve's status. If the above five reserves qualified for a status 2 or higher, it would change the classification for 0.5 percent of reserve land in Pima County.

The U.S. Bureau of Land Management has 135,520 acres of land in status 3b. The Empire-Cienega RCA (31,906 acres) is developing a management plan due out in the spring of 2000. Depending on management practices, the reserve may be placed in status 1 or 2. Changes in the management of the Silverbell RCA (100,369 acres) are not underway at this time.

Similarly, no changes in the management practices of the U.S. Forest Service, the U.S. Department of Defense, and the State of Arizona reserves are known to staff. Combined, these areas form 21.6 percent of Pima County land in reserves.

5.4 Species-specific Analysis

The GAP land stewardship classification is intended for land cover analysis over large regions. It is not a substitute for species-specific review of land management. For instance, it cannot be assumed that because 100 percent of known locations or habitat of a given species are in Status 1 preserves, the species itself is adequately conserved. It would not be correct to conclude that 100 percent of the natural cover associated with known populations is protected against future conversions. The significance of future mining and water diversions to the species would need to be examined, and the limitations of knowledge about the species distribution would have to be considered to draw specific conclusions about species protection.

Because vegetation is only one component of habitat for plants and animals, it cannot be assumed that protecting a high percentage of the vegetation type known to be associated with the species will be sufficient. For instance, say a particular snake species is known to occur only in creosote-bursage vegetation and a high percentage of creosote-bursage vegetation is to be protected. One could protect the vegetation without protecting any of the habitat for the snake if the snake has particular soil-substrate requirements.

6.0 Recommendations

1. Existing mineral withdrawals should be documented for each reserve, particularly those known to have mineral potential. A GIS representation of areas with mineral withdrawals should be developed.
2. Existing or potential surface-water or groundwater diversions affecting reserves should be described.
3. Security of land cover relative to mining and ground-water should be considered in evaluations of land cover protection.
4. Reserve descriptions should be reviewed by reserve managers for accuracy.
5. If fire is an important ecosystem process, areas where fire could be used as a management tool should be identified.

7.0 References

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Appendix A

Reserve Management Plan Summaries

Barry M. Goldwater Range

Size:

- 44,279 acres

Reserve Document:

- Act of Congress--Withdrawal of Public Lands for Military Purposes Act of 1986 (R.L. 99-606)

Activities permitted:

- Military activities

GAP Status

- Status 3b

The BMGR in Pima County is part of the South Tactical Range (S-Tac). Military activities in this area include air-to-ground firing (bombing), which is considered detrimental for maintaining the natural integrity in the area. The S-Tac Range is closed to the public to protect public safety and prevent interference with military operations.

A Final Legislative Environmental Impact Statement was sent to Congress March 1999.

Bingham Cienega Natural Preserve

Size:

- 284.2 acres of Pima County Flood Control District land

Reserve Document:

- None

Activities Allowed:

- Hiking
- Hunting (only with written permission from Nature Conservancy)
- Public education

GAP Status

- Status 3a

The Management Agreement with The Nature Conservancy and the Flood Control District Board of Supervisors is not permanent, only covering a term of 25 years, beginning in 1989. The reserve is managed to protect biodiversity.

Restoration activities are underway of former farm fields within the reserve.

- ✓ September 1992 Management Plan for Bingham Cienega as well as a fire management plan.

BOR Wildlife Mitigation Corridor

Size:

- 2,514 acres in two tracts separated by CAP canal (consisting of 216 acres in this area)

Reserve Document:

- Intergovernmental agreement: *Cooperative Agreement for use of Project Lands for Wildlife and Plant Conservation and Management, Tucson Mitigation Corridor, Central Arizona Project*
- Resolution No. 1989-248: *Resolution Calling for the Execution of a Cooperative Agreement for use of Project Lands for Wildlife and Plant Conservation and Management of the Tucson Mitigation Corridor, Central Arizona Project.*

Activities permitted:

- There are several stock tanks which collect natural run-off.
- Bow hunting allowed
- Research/studies (usually on wildlife) permitted

GAP Status

- Status 2

Cooperative agreement for wildlife and plant conservation and management between Pima County and BOR may be terminated with a 60 day notice.

Management plan strives to prohibit any future developments in the area, except for the improvement of wildlife habitat.

The CAP canal bisects the mitigation corridor. Three siphons and two crossings are located along the Tucson Aqueduct.

A water catchment is found on either side of the aqueduct.

- ✓ A 1990 Master Management Plan does exist for the BOR Mitigation Corridor.

Buenos Aires National Wildlife Refuge

Size:

- 121,308 acres

Reserve Document

At this time, the Executive Order establishing this reserve is not known by County staff. The reserve is managed under legislative mandates authorized by Congress.

- Executive Order 12996
- National Wildlife Refuge Administration Act
- Refuge Recreation Act
- Endangered Species Act

Activities Permitted:

- Birdwatching and wildlife observation
- Camping
- Hunting
- Educational activities
- Hiking

GAP Status:

- Status 1a

Although a management plan for the Buenos Aires National Wildlife Refuge is not completed (due out in February 2000), it is managed for preservation of the endangered masked bobwhite.

This area has the largest ungrazed grassland in the state.

Review of the management plan may change GAP status-depending on how fire is managed, and how heavily visited the reserve is.

Cabeza Prieta National Wildlife Refuge

Size:

- 429,750 acres

Reserve Documents

Cabeza Prieta NWR

- Executive Order 8038
- Public Land Order 5493

Wilderness Area

- Arizona Desert Wilderness Act, 1990

Activities Permitted:

- Wildlife tanks
- Hunting
- Hiking
- Camping
- Public Information

GAP Status

Cabeza Prieta NWR

- Status 1b
- 56,592 acres

Wilderness Area

- Status 1a
- 373,158 acres

- ✓ September 1998 Management Plan

Fire management--no prescribed burns; if fire is discovered usually burns out before suppression can start; if threatening destruction of private property, will be "aggressively suppressed."

Cabeza Prieta NWR has 159 miles of 4WD administrative trails, leading to developed waters and other wildlife management purposes.

A 4WD visitor use trail (200' wide corridor) runs through the wilderness.

Cabeza Prieta administrators maintains and hauls water to 22 developed waters, 17 of which are in the wilderness area.

Airspace over 822,000 of the park is part of Barry M. Goldwater Range. A Memorandum of Understanding between the Air Force and the FWS allows for military flights 1,500 feet above ground level. The MOU also allows for the use of live fire confined to air to air combat above 5,000 feet. In the MOU, the Air Force formally agreed to assist in research projects involving potential impacts to the refuge resources from aircraft flights. Impacts of the flights on wilderness has not yet been studied.

No livestock grazing allowed--there are some renegade trespassing cows from Mexico. Draft CCP addresses this problem.

Reference

US Fish and Wildlife Service. *Final Programmatic Environmental Assessment for the Future Management of Cabeza Prieta National Wildlife Refuge and Draft Comprehensive Conservation Plan*. 1998. USFWS, Cabeza Prieta National Wildlife Refuge.

Catalina State Park

Area

- 5,493.29 acres

Reserve Document

- Arizona State House Bill 2280

Activities permitted

Natural Zone (~4,660 acres): Day-use activities only:

- Hiking
- Mountain biking
- Horseback riding
- Public education

Cultural Zone (~30 acres)

- Excavation, renovation of archeological sites

Park Development Zone (~800 acres):

- Camping
- Picnicking
- Any future developments

GAP Status

- Status 2
- ✓ December 1991 Management Plan

While the primary purpose of the park is to preserve natural resources, the management plan allows for intensive, anthropogenic disturbances such as developed or motorized recreation on more the 5% of the land.

85% of the park is designated 'natural area,' while 15% is developed area. The Catalina State Park Management Plan states that any future development will remain in the 15%.

Natural Zone:

- Status 2
- 4,660 acres

Suppression of natural disturbances, such as fire, is called for in the Management Plan.

Cultural Zone:

- Status 2
- 30 acres

Park Development Zone:

- Status 3b
- 800 acres

Reference

Catalina State Park Management Plan. 1991. Arizona State Parks Board, Coronado National Forest USDA, Forest Service.

Cienega Creek Natural Preserve

Size:

- 3,979 acres total

Management Zone A: 3,074 acres

Management Zone B: 905 acres

Reserve Document:

Covenants, conditions and restrictions adopted by the Board of Supervisors:

- Memorandum of Understanding, Arizona State Parks Board, Natural Area Register
- Cooperative Management Agreement between: Walter D. Armer (Co-Trustee of the Winston Wheeler Trusts), Pima County Flood Control District, and Arizona Board of Regents (on behalf of U of A School of Renewable Resources).
- Declaration of Restrictions, Covenants and Conditions for the Cienega Creek Natural Preserve.

Activities permitted:

Management Zone A

- Hunting
- Hiking
- Picnicking
- Wading
- Horseback riding
- Mountain biking
- Public Education
- Utility installation
- Surface water diversions

Management Zone B

- Hunting
- Hiking
- Picnicking
- Horseback riding
- Mountain biking
- Livestock grazing
- Utility installation
- Public education
- Groundwater pumping

GAP Status

- Status 1a (in the area protected by Conditions, Covenants, and Restrictions--not including all of *Management Zone A*)
- Status 3a (area of Cienega Creek not protected by CCR and Empirita Ranch-*Management Zone B*)
- ✓ October 1994 Management Plan

While the reserve documents are legally binding, the protection is not permanent, except in the area protected by CCR's.

Management Zone A: Consists of all of areas of the Preserve north of I-10 (includes perennial stream flow and riparian woodland). This area will be managed to preserve the riparian area, and development will be restricted to facilities at designated points of access and a trail system. 1,100 acre feet per year diverted by Vail Water Company.

Management Zone B: Consists of Empirita Ranch, a portion of Cienega Creek which does not exhibit perennial stream flow, and a 25 acre site near Colossal Cave Road. Development will be more extensive in this area, with proposed campgrounds and recreational facilities. 1,600 acre feet of future ground water pumping by others is permitted.

Colossal Cave Mountain Park

Size:

- 2,238 acres

Reserve Document:

- None
- Formally established by Pima County Board of Supervisors in 1992.

Activities Permitted:

- Hiking
- Camping
- Horseback riding
- Mountain biking
- Picknicing
- Public education

GAP Status:

- Status 3b
- ✓ Does not have a management plan

Colossal Cave Mountain Park does not have a permanent reserve document.

Coronado National Forest

Size:

- 337,853 acres including Research Natural Areas (RNA)
- Butterfly RNA 1,128 acres
- Santa Catalina RNA 881 acres

Managing Document:

- Coronado National Forest Land and Resource Management Plan Final Environmental Impact Statement

Activities Permitted:

- | | | |
|-----------------------------|--------------------|----------------------------|
| • Mining | • Fishing | • Surface water diversions |
| • Aggregate or fill removal | • Trapping | • Stock tank |
| • Landfills | • Hiking | • New utilities |
| • Sewage treatment | • Camping | • Grazing |
| • New roadways | • Mountain biking | • Farming |
| • Groundwater pumping | • Woodcutting | • Archery/rifle range |
| • Hunting range | • Horseback riding | • Public education |
| | • Picnicking | • Recreational residences |
| | • Skiing | |

Activities Allowed in Research Natural Areas

- Non-disruptive research and education
- Hiking

GAP Status:

Unreserved Coronado National Forest

- Status 3b
- ✓ 1986 Management Plan

In 1986, the USDA Forest Service approved an EIS for the Coronado National Forest Management Plan. The management plan is good for 15 years (from approval date in 1986), and will need to be updated and a new plan prepared at the end of the 15 years.

Coronado National Forest is subject to extractive uses that are detrimental, mining, and logging.

Research Natural Areas

- Status 1a

Recreational uses are not encouraged in the RNA's, although trails remain open for public use.

Organ Pipe Cactus National Monument

Size:

Wilderness Area: 314,883 acres
National Monument: 3,518 acres

Reserve Documents:

Organ Pipe National Monument

- Presidential Proclamation 2232

Wilderness Area

- 1964 Wilderness Act

Activities Permitted:

Organ Pipe National Monument

- Camping
- Hiking
- Mountain biking
- Picnicking
- Public education

Wilderness Area

- Camping
- Hiking

Cultural Resources Overlay Zone

- Hiking
- Public education

GAP Status

Organ Pipe National Monument

- Status 2
- ✓ 1997 Management Plan

State Route 85 runs through approximately 22 miles of the monument. The road experiences high speed traffic and is responsible for wildlife road-kill. The road also presents a barrier to wildlife movement. An alternative management action calls for the translocation of current power-lines. The power-lines would be removed from their current location and buried underground, following State Route 85.

Much of the monument is developed or is planned for development. Development plans include new facilities related to employee, research, and visitor use.

One objective of the management plan is to redesignate the status of the Organ Pipe Cactus National Monument to the Sonoran Desert National Park. Management states that the designation of a National Park would be more suitable for the Monument, and as a National Park, would acquire more funding.

Wilderness Area

- Status 1a

Cultural Resources Zone:

- Status 1

Santa Rita Experimental Range

Size:

- 50,811 acres

Reserve Documents:

- Executive Order

Managing Entity:

- University of Arizona

Activities Permitted:

- The University of Arizona conducts research, education and extension work on biology, forestry, geology, livestock, watershed, wildlife and related sciences.

GAP Status

- Status 3b
- ✓ Does not have a management plan

The range has 71 miles of roads, 122 miles of traditional range fencing, several miles of water pipes, and 21 cattle guards.

The SRER land is leased to the U of A from the State of Arizona. The lease states, "The Premises shall be used solely and exclusively for Ecological and Rangeland Research."

The SRER is used as an "outdoor experimental laboratory." Its sole purpose is not to maintain a natural state, but to explore ways to manage range lands for a variety of uses. This involves introduction of exotic species, brush control, fire as a management tool, and other uses that may be detrimental to maintaining biodiversity.

Saguaro National Park

Size:

East

- Saguaro National Park: 8,804 acres
- SNP Wilderness Area: 58,581 acres

West

- Saguaro National Park: 10,433 acres
- SNP Wilderness Area: 12,992 acres

Reserve Document:

- Saguaro National Park Establishment Act of 1994 -- Public Law No. 103-364
- 1976 Act of Congress--Public Law No. 94-567

East

- Presidential Proclamation No. 2032

West

- Presidential Proclamation No. 3439

Activities Permitted:

- Hiking
- Picnicking
- Mountain biking
- Camping
- Public education

GAP Status:

Saguaro National Park (East and West)

- Status 1b

SNP Wilderness Areas

- Status 1a

- ✓ 1995 Statement for Management and 1999 General Management Plan Amendment

SNP East and West are broken into four different management zones: the natural zone, development zone, historic zone, and special use zone.

- The natural zone includes the majority of park lands. Management emphasis is on the conservation of natural resources and processes.
- The development zone encompasses small areas around areas of heavy visitor use and management facilities. The zone includes areas that have been heavily altered from the natural environment.
- The historic zone applies to site-specific areas and may overlap in another type of zone.
- The special use zone are areas within the boundaries of the park, but are owned or managed by other agencies or private interests.

The Nature Conservancy (Buehman Canyon and other deeded lands)

Size: 2,793

Reserve Document:

- Deeds to the properties

Activities permitted:

- Mining
- Hunting
- Hiking
- Picnicking
- Public education

GAP Status

- Status 1b

TNC lands have permanent protection and are managed to maintain a natural state and natural processes. A portion of Buehman Canyon Natural Preserve has an active mining claim.

TNC has conservation easements on privately owned lands. The easements are intended to be perpetual, and are meant to prohibit the conversion of natural cover and to maintain a natural state over a majority of the property. Other portions of a property may be subject to localized extractive uses. These lands are given a GAP status 3.

Tucson Mountain Park

Size:

- 18,422.4 acres

Reserve Document:

- Administrative Withdrawal, Recreation Act of 1926

Activities Permitted:

- New roadways
- Groundwater pumping
- Sewage treatment
- Hiking
- Mountain biking
- Camping
- Horseback riding
- Picnicking
- Archery/rifle range
- Hunting
- Public education

GAP Status

- Status 2

The park is not subject to a management plan. A master plan for the park is in development, with specific actions and policies planned to address biological resource issues.

The Tucson Mountain Park is bisected with roads, some of which are heavily traveled at high speeds.

The increased use of the commercial developments in the park (Sonoran Desert Museum and Old Tucson) increases traffic and related noise and animal road-kill, increasing demands on the park's water supply, and higher maintenance costs.

Management concerns include impacts of off-trail use, domestic pets, exotic plants and animals, and road-killed wildlife.

Residential and commercial development along the park's south and west borders.

Tortolita Mountain Park

Size:

- 3,445.75 acres

Reserve Document

- formally established by the Pima County Board of Supervisors

Activities permitted

- New utilities
- Hiking
- Camping
- Horseback riding
- Mountain biking
- Picnicking
- Hunting

GAP Status:

- Status 3a

There is no permanent reserve document for this park.

- ✓ The Tortolita Mountain Park is not subject to a management plan. The park does have a master plan which addresses management issues.
- Lands south and east of the park are becoming increasingly developed.
- The park's Master Plan has implemented the development of trails, day-use areas, and campgrounds, though the developments are limited to the periphery of the park.

U.S. Bureau of Land Management Resource Conservation Areas
Silverbell and Empire-Cienega RCA's

Size:

Silverbell

- 100,369 acres

Empire-Cienega

- 31,906 acres

Reserve Document:

- None

Activities Permitted:

- Mining
- Grazing
- Groundwater pumping
- New roadways
- Off-road driving
- New utilities
- Stock tank
- Aggregate/fill removal
- Hunting
- Fishing
- Hiking
- Mountain biking
- Picnicking
- Public education
- Horseback riding
- Camping

GAP Status:

- Status 3b

The BLM will retain land in the Resources Conservation Areas. This land is protected from residential development, but due to the 1872 Mining Act, mining is permitted on public lands. The BLM lands also allow grazing, a practice which may degrade the natural quality of the land.

The Silverbell RCA does not have a specific management plan-though it is discussed in the Phoenix RMP (BLM Dec 1998).

A management plan for the Empire Cienega RCA is due out in the spring of 2000. Depending on the final management practices and level of protection, the Empire-Cienega RCA may be moved to a GAP status of 1 or 2.

U.S. Bureau of Land Management Wilderness Areas
Coyote Mountain WA, Baboquivari Peak WA

Size:

Baboquivari Peak

- 2,079 acres

Coyote Mountain

- 5,103 acres

Reserve Document:

- Public Law 101-628, Arizona Desert Wilderness Act of 1990

Activities Permitted:

- Stock tanks
- Grazing *
- Hunting
- Fishing
- Hiking
- Climbing
- Camping
- Picnicking

GAP Status:

- Status 1a

✓ Both areas are administered by the BLM and are included under the *Proposed Phoenix Resource Management Plan and Final EIS*.

The Tohono O'odham Indians have submitted a draft bill to Congress requesting the transfer of Baboquivari Peak WA to their ownership for religious purposes. The future of this draft bill is pending.

* Grazing is permitted in Wilderness Areas, though due to the restrictions imposed by the Wilderness Act of 1964 (no motorized vehicles, motorized equipment, or installation of structures), grazing these areas is inconvenient.

Waterman Area of Critical Environmental Concern (ACEC)

Size:

- 3,245 acres

Reserve Document:

- None

Land Manager:

- U.S. Bureau of Land Management

Activities Permitted:

- Hunting
- Hiking
- Mountain biking
- Picnicking

GAP Status:

- Status 2
- ✓ This area is included in the Proposed Phoenix BLM Management Plan.

The Waterman ACEC is an area of which supports a federally listed endangered species- Nichols Turk's Head Cactus (*Echinocactus horizonthalonius var. nicholii*).

The area is managed specifically for Nichols Turk's Head Cactus. Depending on the frequency of visitor and recreation use, this ACEC may be moved to status 1 with a more inclusive management plan.

The ACEC has been withdrawn from subsurface mineral rights.